



Spring 2001 Released Test

(Supplemental Information)

End of Course

Earth Science

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Introducing the Virginia Standards of Learning

Earth Science

One of the complete test forms from the Spring 2001 Standards of Learning administration is presented in the following pages. The intent of this released test is to provide parents and teachers additional information to accompany the Student Performance Report and/or the Parent Report.

The information accompanying each test question is broken into several components:

Reporting Category: Matches the score report and allows for identification of strengths and weaknesses indicated by student scores.

Standard of Learning: Presents the SOL used in developing the assessment question.

Instruction: Provides information for teachers to use as the SOL is incorporated into instruction.

The answer to each question can be found at the back of the booklet.

Earth Science

End of Course

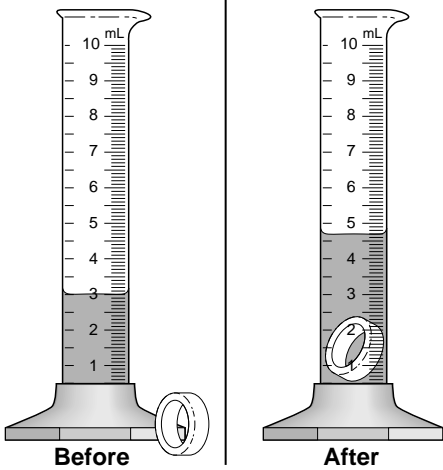
Reporting Category: Scientific Investigation

A. Standard of Learning: ES.1 The student will plan and conduct investigations which

a) volume, area, mass, elapsed time, direction, temperature, pressure, distance, density, and changes in elevation/depth are calculated utilizing the most appropriate tools.

Builds On: Work with these measurements begins with the second grade SOL and increases in complexity through the eighth grade SOL.

A 1



Before **After**

One step in determining the metal content of a ring is to find the volume of the ring. What is the volume of this ring?

A 1.7 mL
B 3.0 mL
C 4.7 mL
D 7.1 mL

Instruction: Provide students an opportunity to investigate how to measure mass and volume of objects and calculate density.

Earth Science

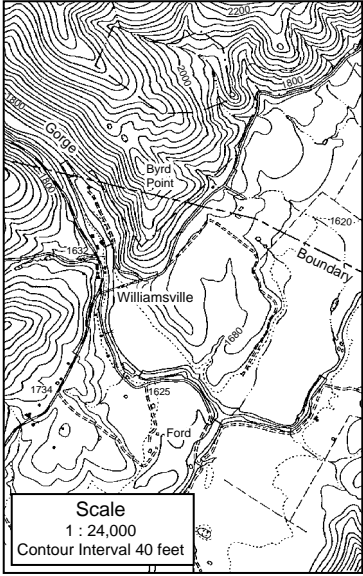
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A. Standard of Learning: ES.1 The student will plan and conduct investigations which

c) scales, diagrams, maps, charts, graphs, tables, and profiles are constructed and interpreted.

Builds On: Work with construction and interpretation of diagrams, charts, and graphs begins in the first grade SOL and increases in complexity through the eighth grade SOL.

A 2



Scale
1 : 24,000
Contour Interval 40 feet

What is the actual distance represented by 1 inch on this map?

F 24 feet
G 40 feet
H 24,000 inches
J 48,000 inches

Instruction: Provide students an opportunity to interpret scales or maps.

Earth Science

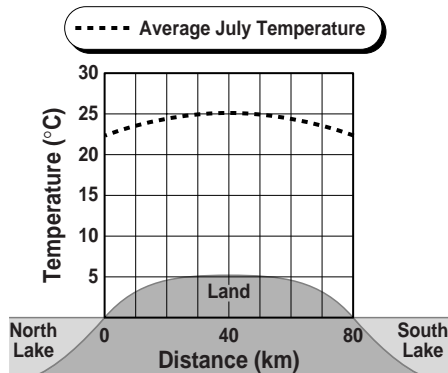
End of Course

A. Standard of Learning: ES.2 The student will demonstrate scientific reasoning and logic by
b) recognizing that evidence is required to evaluate hypotheses and explanations.

Builds On: Work with evidence required to evaluate hypotheses begins in the second grade SOL and increases in complexity through the eighth grade SOL.

A

3

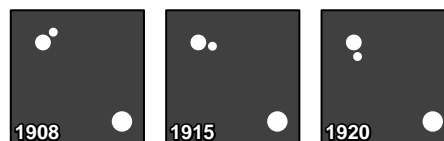


Hypothesis: In the summer, the warmest air will be closest to South Lake.

According to the data shown by the graph, the warmest air during the summer will be found —

- A closest to North Lake
- B above South Lake
- C above the land between the lakes
- D closest to the water level of the lakes

4



The pictures show the same stars at different times. Which hypothesis is best supported by these data?

- F The stars are moving toward one another.
- G The three stars are moving very fast.
- H One star is moving around another star.
- J The biggest star is closest to the Earth.

Instruction: Provide students an opportunity to analyze and interpret graphs and other pictorial data to evaluate hypotheses.

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A. Standard of Learning: ES.2 The student will demonstrate scientific reasoning and logic by
d) explaining that observation and logic are essential for reaching a conclusion.

Builds On: Work with explaining that observation and logic are essential for reaching a logical conclusion begins in the second grade SOL and increases in complexity through the eighth grade SOL.

A

5 A student sees a very bright star in the sky and thinks it might be the planet Venus. Which observation would lend support to this conclusion?

- A After a few minutes, its position relative to the surrounding stars has changed significantly.
- B After an hour, its position relative to the horizon has changed.
- C After an hour, its brightness has faded significantly.
- D After a month, its position relative to the surrounding stars has changed.

Instruction: Provide students an opportunity to make observations and form logical conclusions.

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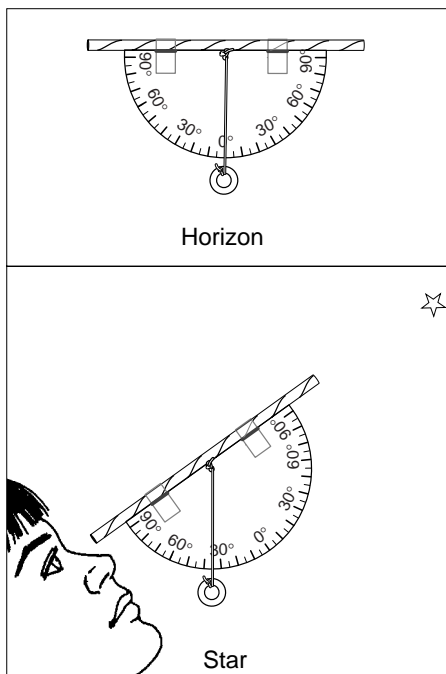
A. Standard of Learning: ES.3 The student will investigate and understand how to read and interpret maps, globes, models, charts, and imagery. Key concepts include

a) maps (bathymetric, geologic, topographic, and weather) and star charts.

Builds On: Work with interpretation of maps begins in the third grade SOL and increases in complexity through the eighth grade SOL.

A

6

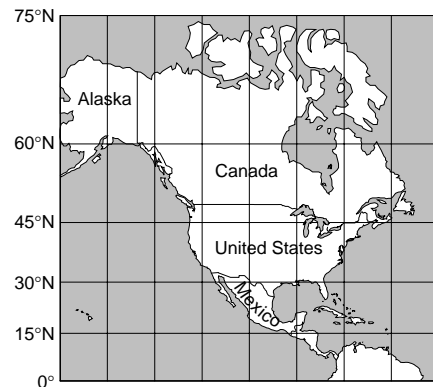


What is the position of the star above the horizon?

- F 35°
- G 40°
- H 55°
- J 60°

7

Mercator Projection of North America



In this Mercator map of North America, Canada and Alaska together appear larger than the United States and Mexico together when in fact they are smaller. What causes this distortion?

- A Mountains get flattened on a map so that mountainous areas look larger than they really are.
- B The northern regions are enlarged because the shallower parts of the oceans are frozen.
- C The latitude and longitude lines create an optical illusion.
- D The map is a projection of a round world onto a flat surface.

Instruction: Provide students an opportunity to interpret information from a variety of maps, charts, and tools.

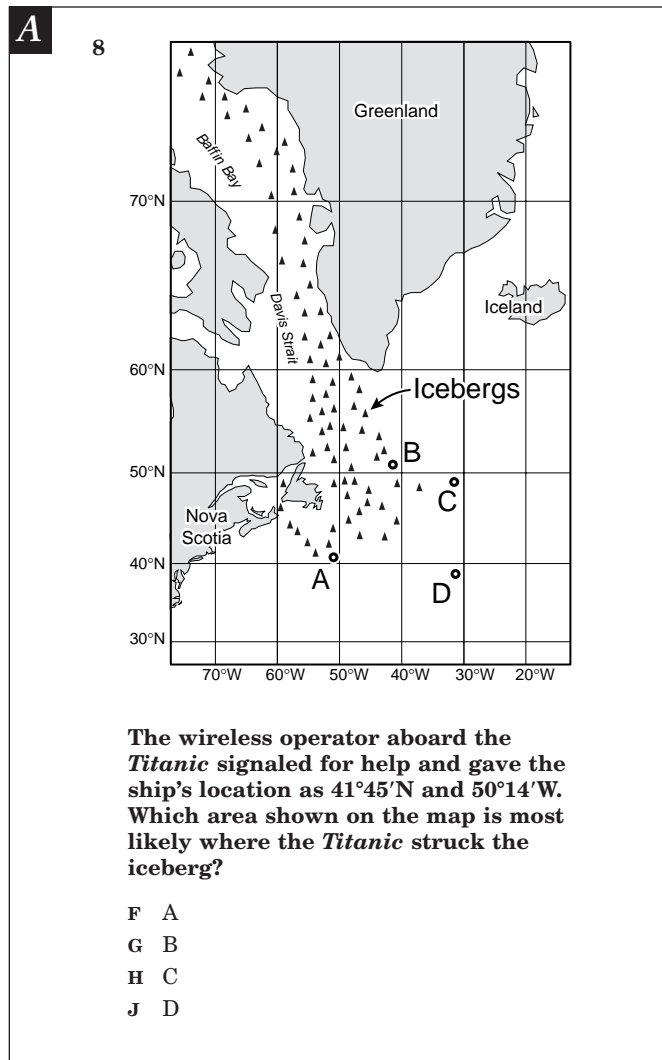
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A. Standard of Learning: ES.3 The student will investigate and understand how to read and interpret maps, globes, models, charts, and imagery. Key concepts include

d) location by latitude and longitude and topographic profiles.

Builds On: Work with latitude and longitude begins in the fourth grade SOL and increases in complexity through the eighth grade SOL.



Instruction: Provide students an opportunity to interpret location by using longitude and latitude.

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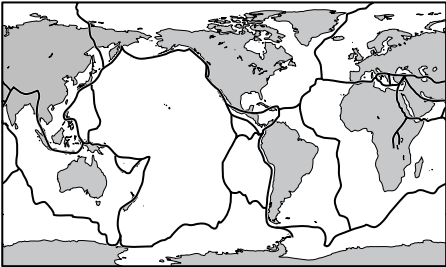
Reporting Category: Geology

A. Standard of Learning: ES.4 The student will investigate and understand the characteristics of the Earth including

a) plate tectonics.

Builds On: Work with geological process begins in the fourth grade SOL and increases in complexity through the eighth grade SOL.

A 9 Plate Boundaries



Which of the following major earthquakes did not occur at a boundary between tectonic plates?

- A South Carolina (U.S.A.) 1886
- B San Francisco (U.S.A.) 1906
- C Messina (southern Italy) 1908
- D Chillan (Chile) 1939

Instruction: Provide students an opportunity to investigate the earthquake activity associated with plate boundaries.

Earth Science

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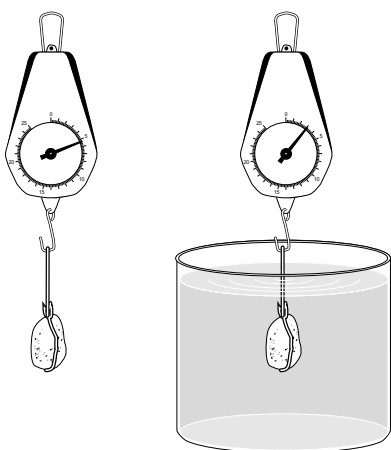
A. Standard of Learning: ES.5 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. Key concepts include

a) properties including hardness, color and streak, luster, cleavage, fracture, and unique properties.

Builds On: Work with physical properties begins in the kindergarten SOL and increases in complexity through the eighth grade SOL.

A

10



Using this procedure, what property of a mineral can be found?

- F Crystal arrangement
- G Specific gravity
- H Brittleness
- J Fracture

11

Mineral Classification				
Mineral	Crystal System	Density	Streak	Chemical Formula
Bauxite	Amorphous	2.0-2.5	White-brown	Al_2O_3
Hematite	Hexagonal	5.2-5.3	Cherry-red	Fe_2O_3
Pyrolusite	Tetragonal	4.7-5.0	Blue-black	MnO_2
Uraninite	Isometric	7.5-9.7	Metallic black	UO_2

These minerals may be grouped together because they all have —

- A the same crystal systems
- B constant density values
- C shiny streaks
- D the oxygen ion

Instruction: Provide students an opportunity to investigate physical properties of minerals.

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A. Standard of Learning: ES.6 The student will investigate and understand how to identify common rock types based on mineral composition and textures and the rock cycle as it relates to the transformation of rock types. Key concepts include

a) igneous (intrusive and extrusive).

Builds On: Work with rock formations begins in the second grade SOL and increases in complexity through the eighth grade SOL.

A

12 Because granite cools below the surface of the Earth, it is —

F an igneous extrusive rock

G an igneous intrusive rock

H a sedimentary rock

J a metamorphic rock

Instruction: Provide students an opportunity to investigate how sedimentary rocks are formed.

Earth Science

End of Course

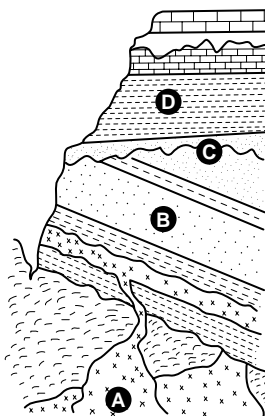
A. Standard of Learning: ES.6 The student will investigate and understand how to identify common rock types based on mineral composition and textures and the rock cycle as it relates to the transformation of rock types. Key concepts include

b) sedimentary (clastic and chemical).

Builds On: Work with rock formations begins in the second grade SOL and increases in complexity through the eighth grade SOL.

A

13



What appears to have occurred at the area labeled B?

- A Sediment was deposited on sloped ground.
- B Sediment was deposited on sloped ground that later became level.
- C Sediment was deposited on level ground that later tilted.
- D Sediment was deposited on level ground that stayed level.

Instruction: Provide students an opportunity to determine the formation of sediment and to interpret diagrams of rock layers.

Earth Science

End of Course

A. Standard of Learning: ES.6 The student will investigate and understand how to identify common rock types based on mineral composition and textures and the rock cycle as it relates to the transformation of rock types. Key concepts include

c) metamorphic (foliated and unfoliated) rocks.

Builds On: Work with rock formations begins in the second grade SOL and increases in complexity through the eighth grade SOL.

A

14 All of the following are characteristics of metamorphic rocks *except* —

- F flattened crystals
- G colored, parallel layers
- H bending from pressure
- J holes from trapped gases

Instruction: Provide students an opportunity to investigate the characteristics of metamorphic rock.

B. Standard of Learning: ES.7 The student will investigate and understand the differences between renewable and nonrenewable resources. Key concepts include

a) fossil fuels, minerals, rocks, water, and vegetation.

Builds On: Work with renewable and nonrenewable resources begins in the third grade and continues to increase in complexity through the eighth grade SOL.

B

15 The mineral resources of Virginia can be conserved by doing all of the following *except* —

- A recycling
- B reducing
- C regenerating
- D reusing

Instruction: Provide students an opportunity to investigate various methods of conserving natural resources.

Earth Science

End of Course

A. Standard of Learning: ES.7 The student will investigate and understand the differences between renewable and nonrenewable resources. Key concepts include

b) advantages and disadvantages of various energy sources.

Builds On: Work with energy sources begins with the third grade SOL and continues to increase in complexity through the eighth grade SOL.

A

16 Which of these energy sources produces the *least* harmful environmental effects?

- F Nuclear
- G Fossil fuels
- H Solar
- J Hydroelectric

Instruction: Provide students an opportunity to investigate the advantages and disadvantages of various energy sources.

B. Standard of Learning: ES.7 The student will investigate and understand the differences between renewable and nonrenewable resources. Key concepts include

c) resources found in Virginia.

Builds On: Work with energy sources begins with the third grade SOL and continues to increase in complexity through the eighth grade SOL.

B

17 Many quarries in Virginia produce crushed stone. What industry uses the most crushed stone?

- A Plastics
- B Construction
- C Electronics
- D Steel

Instruction: Provide students an opportunity to investigate the types and uses of the major mineral resource of Virginia.

Earth Science

End of Course

A. Standard of Learning: ES.7 The student will investigate and understand the differences between renewable and nonrenewable resources. Key concepts include

d) use of resources and their effects on standards of living

Builds On: Work with use of resources and their effects on standards of living begins in the third grade SOL and continues to increase in complexity through the eighth grade SOL.

A

18

Worldwide CO₂ Release

Country	Tons/Year (per capita)
United States	5.9
Canada	5.2
Germany	3.1
United Kingdom	2.9
Japan	2.3
France	2.0
Italy	2.0
World Average	1.2

The countries shown here released much more CO₂ than the rest of the world because these countries have the largest —

- F number of people
- G amount of rainfall
- H number of heavy industries
- J amount of land per person

Instruction: Provide students an opportunity to investigate the causes of increased carbon dioxide production.

Earth Science

End of Course

A. Standard of Learning: ES.7 The student will investigate and understand the differences between renewable and nonrenewable resources. Key concepts include

e) environmental costs and benefits.

Builds On: Work with importance of natural resources begins with the fourth grade SOL and continues to increase in complexity through the eighth grade SOL.

A

19 The amount of power that can be generated by a hydroelectric dam would be most dependent on which two factors?

- A The width of the dam and the construction material of the dam
- B The volume of water going over the dam and the distance that the water falls
- C The surface area of the reservoir and the shape of the reservoir floor
- D The temperature of the water and the amount of oxygen that it contains

Instruction: Provide students an opportunity to investigate the use of hydroelectric power generation.

B. Standard of Learning: ES.8 The student will investigate and understand geologic processes including plate tectonics. Key concepts include

a) how geologic processes are evidenced in the physiographic provinces of Virginia including the Coastal Plain, Piedmont, Blue Ridge, Valley and Ridge, and Appalachian Plateau.

Builds On: Work with understanding that the earth's surface is constantly changing begins in the fifth grade SOL and increases in complexity through the eighth grade SOL.

B

20 The presence of many metamorphic rocks in Virginia is an indication that the area has been subjected to —

- F intense heat and pressure
- G limited volcanic activity
- H deep ocean venting
- J massive solar bombardment

Instruction: Provide students an opportunity to investigate the geologic forces that shaped geology of Virginia.

Earth Science

End of Course

A. Standard of Learning: ES.8 The student will investigate and understand geologic processes including plate tectonics. Key concepts include

b) processes (faulting, folding, volcanism, metamorphism, weathering, erosion, deposition, and sedimentation) and their resulting features.

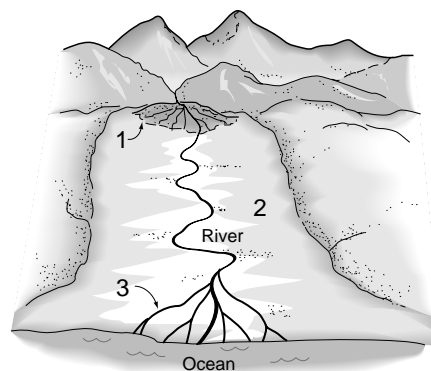
Builds On: Work with weathering and erosion begins with the second grade SOL and increases in complexity through the eighth grade SOL.

A

21 Which of the following is an example of chemical weathering?

- A Splits in a rock due to tree roots
- B Pulverized rock resulting from a landslide
- C A rock broken into chunks after being carried by rapidly flowing water
- D The dissolving of limestone by acid rain

22



Which answer below matches the number in the drawing with the correct name of a sedimentary formation?

- F 1-delta, 2-continental rise, 3-flood plain
- G 1-alluvial fan, 2-flood plain, 3-delta
- H 1-barrier island, 2-continental shelf, 3-alluvial fan
- J 1-continental shelf, 2-continental rise, 3-barrier island

Instruction: Provide students an opportunity to investigate how a river can cause erosion and sedimentation; and investigate mechanisms of chemical weathering.

Earth Science

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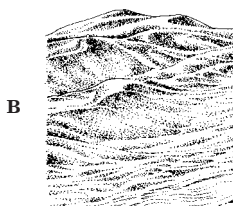
A. Standard of Learning: ES.8 The student will investigate and understand geologic processes including plate tectonics. Key concepts include

b) processes (faulting, folding, volcanism, metamorphism, weathering, erosion, deposition, and sedimentation) and their resulting features.

Builds On: Work with weathering and erosion begins with the second grade SOL and increases in complexity through the eighth grade SOL.

A

23 Which of these best shows wind-deposited sediments?



Instruction: Provide students an opportunity to investigate various mechanisms of erosion.

Earth Science

End of Course

A. Standard of Learning: ES.8 The student will investigate and understand geologic processes including plate tectonics. Key concepts include

c) tectonic processes (subduction, rifting and seafloor spreading, and continental collision).

Builds On: Work with the geological processes of the ocean begins with the fourth grade SOL and increases in complexity through the eighth grade SOL.

A

24 All of the following support the theory of continental drift *except* that —

- F** the continents seem to fit together like pieces of a puzzle
- G** there are similar fossils on different continents
- H** mountain ranges in South America and Africa line up
- J** the North Pole and Antarctica are covered with ice

25 What is the fewest number of seismographic stations that must record the arrival time of *P* and *S* waves in order for the epicenter of an earthquake to be located?

- A** 2
- B** 3
- C** 5
- D** 10

Instruction: Provide students an opportunity to investigate the chronological order of geologic events and to investigate a seismogram to understand primary and secondary waves.

B. Standard of Learning: ES.9 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. Key concepts include

b) development of karst topography.

Builds On: Work with the effects of water on the Earth's surface begins with the second grade SOL and continues with increasing complexity through the eighth grade SOL.

B

26 Sinkholes associated with natural processes are characteristic of what type of bedrock?

- F** Limestone
- G** Granite
- H** Basalt
- J** Gneiss

Instruction: Provide students an opportunity to investigate sinkhole formation.

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A. Standard of Learning: ES.10 The student will investigate and understand that many aspects of the history and evolution of the Earth and life can be inferred by studying rocks and fossils. Key concepts include

a) traces or remains of ancient, often extinct, life are preserved by various means in many sedimentary rocks.

Builds On: Work with fossil evidence begins in the second grade SOL and increases in complexity through the eighth grade SOL.

A

27



The picture shows a limestone building block. Which observation best shows that the limestone was formed from ocean sediments?

- A The thickness of the rock layers
- B The number of fossils
- C The type of fossils
- D The size of the fossils

- 28 Not all fossils have been preserved inside soil or rock. Explorers in Siberia have discovered the bodies of ancient mammoths so well-preserved that the flesh could be eaten. What do you think preserved the mammoths in such a perfect state?

- F Water
- G Ice
- H Leaf mold
- J Carbon dioxide

Instruction: Provide students an opportunity to investigate how fossils are preserved; and how they can be used to demonstrate how life has changed.

Earth Science

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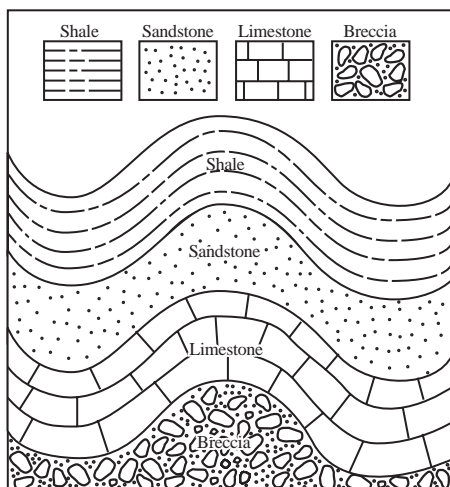
A. Standard of Learning: ES.10 The student will investigate and understand that many aspects of history and evolution of the Earth and life can be inferred by studying rocks and fossils. Key concepts include

b) superposition, cross-cutting relationships, and radioactive decay are methods of dating bodies of rock.

Builds On: Work with changes in the Earth's surface begins in the second grade SOL and increases in complexity through the eighth grade SOL.

A

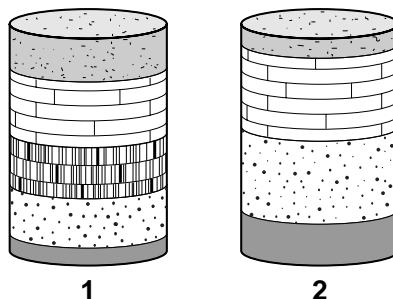
29



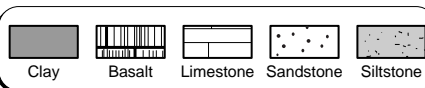
Which layer in this area is the youngest?

- A Shale
- B Sandstone
- C Limestone
- D Breccia

30



Key



Scientists use drill core samples to study the underlying rock structure. These two core samples were obtained from the ocean floor from locations separated by 10 km. Which layer in core sample one does not have a matching layer in core sample two?

- F Basalt
- G Clay
- H Limestone
- J Sandstone

Instruction: Provide students an opportunity to interpret a diagram to locate areas with rocks of similar ages; to investigate the formation of rock in layers; and to analyze core samples.

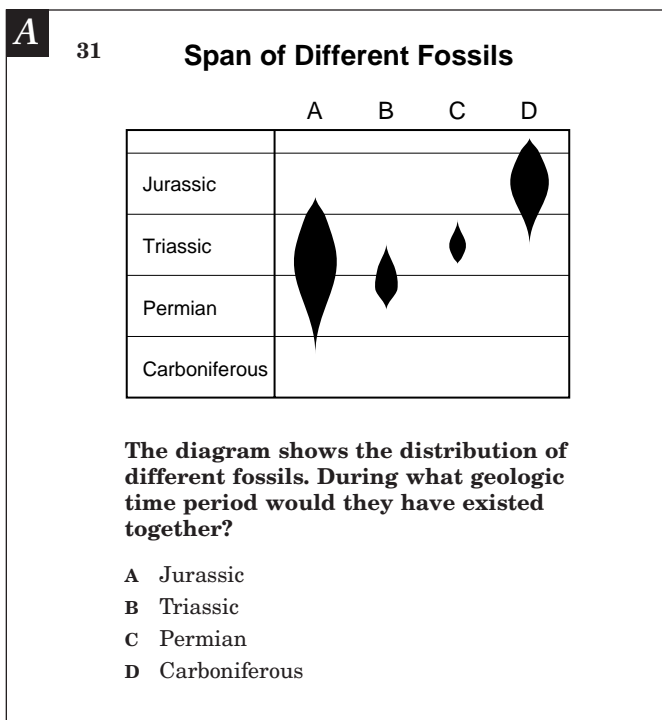
Earth Science

End of Course

A. Standard of Learning: ES.10 The student will investigate and understand that many aspects of history and evolution of the Earth and life can be inferred by studying rocks and fossils. Key concepts include

c) absolute and relative dating have different applications but can be used together to determine the age of rocks and structures.

Builds On: Work with changes in the Earth's surface begins in the second grade SOL and increases in complexity through the eighth grade SOL.



Instruction: Provide students an opportunity to investigate the history of life and changes over time.

Earth Science

End of Course

A. Standard of Learning: ES.10 The student will investigate and understand that many aspects of history and evolution of the Earth and life can be inferred by studying rocks and fossils. Key concepts include

d) rocks and fossils from many different geologic periods and epochs are found in Virginia.

Builds On: Work with rocks and fossils from Virginia of many geologic periods and epochs begins in the second grade SOL and increases in complexity through the eighth grade SOL.

A

32 Geologists think that parts of the Appalachian Mountains formed originally from sediments accumulating in shallow swamps. The weight of the sediments caused the area beneath them to sink, allowing more sediments to accumulate. The process continued until many layers had formed. Then tectonic processes folded the layered sediments into a range of mountains. What evidence for this theory can be found in the current structure of these mountains?

- F** Some rocks making up these mountains show signs of volcanism.
- G** The form of these mountains is very eroded.
- H** The mountains exhibit folded layers of rocks containing fossils from shallow water.
- J** The mountain range consists of parallel ridges of different ages.

Instruction: Provide students an opportunity to investigate fossil remains that may indicate how life has changed over geologic time.

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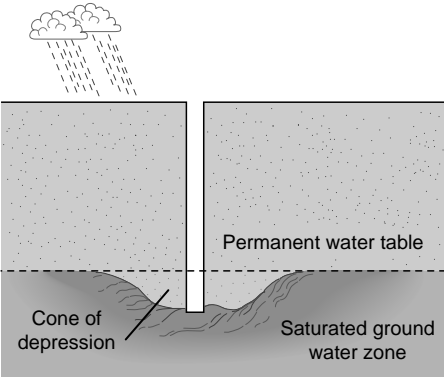
Reporting Category: Meteorology, Oceanography, and Groundwater.

A. Standard of Learning: ES.9 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. Key concepts include

c) identification of groundwater zones including water table, zone of saturation, and zone of aeration.

Builds On: Work with the water supply begins with the third grade SOL and continues through the eighth grade SOL.

A 33



This picture shows a simple well that was dug down to the groundwater. What probably caused the lower level of groundwater, known as a “cone of depression,” in the vicinity of the well?

- A The weight of the atmosphere presses down on the groundwater in the well.
- B The ground below the well acts as a vacuum sucking out the water.
- C Gravity pulls down the water beneath the well.
- D As water is drawn from the well, it takes time for the groundwater to percolate through the soil and restore the level.

Instruction: Provide students an opportunity to investigate the function of wells relative to ground water levels.

Earth Science

End of Course

A. Standard of Learning: ES.9 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. Key concepts include

d) identification of other sources of fresh water including aquifers with reference to the hydrologic cycle.

Builds On: Work with the water supply and conservation of water begins with the third grade SOL and continues to increase in complexity through the eighth grade SOL.

A

34 Only 3% of the Earth's water is fresh water. The world's oceans contain the rest of the Earth's water. Of that 3%, three-fourths is tied up in glaciers, ice caps, and snow fields. Antarctic glaciers contain nearly 85% of all the ice in the world, and floating sea ice in the Arctic contains 10% of the ice. Sea ice freezes from ocean water, but the salt is excluded in the freezing process, resulting in mostly freshwater ice. Where is the remaining 5% of the world's permanent supply of ice and snow?

- F High mountain peaks
- G Permanent Arctic blizzards
- H Floating icebergs
- J Drifting Antarctic snow

Instruction: Provide students with an opportunity to investigate various sources of fresh water.

B. Standard of Learning: ES.11 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include

a) physical and chemical changes (tides, waves, currents, sea level and ice cap variations, upwelling, and salinity concentrations).

Builds On: Work with the oceans begins in the fifth grade SOL and continues to increase in complexity through the eighth grade SOL.

B

35 Fish are abundant in areas where the ocean is upwelling because it —

- A causes currents that carry fish into the area
- B brings nutrients to the surface
- C causes surface turbulence that attracts fish
- D changes tidal flow in that area

36 A boat will float higher in the Atlantic Ocean than it will in the Potomac River because ocean water has —

- F a lower freezing point
- G more organisms in it
- H more oxygen in it
- J a greater density

Instruction: Provide students an opportunity to investigate physical variations of the ocean floor; and to investigate results of changes in ocean salinity.

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A. Standard of Learning: ES.11 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include

b) importance of environmental, geologic, and economic implications.

Builds On: Work with the oceans begins in the fifth grade SOL and continues to increase in complexity through the eighth grade SOL.

A 37 Oil spills have a tremendous impact on the ocean environment, and the oil must be cleaned up after these spills. A new technique for cleaning oil from beaches is called bioremediation. This technique uses naturally occurring bacteria to break down the oil. How is this accomplished?

- A The bacteria bind with the oil and bring it to land.
- B The bacteria pull the oil down to the ocean floor.
- C The bacteria chemically change the oil into less harmful substances.
- D The bacteria die and absorb the oil.

Instruction: Provide students an opportunity to investigate the consequences of human activities and public policy on the oceans.

B. Standard of Learning: ES.11 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include

c) systems interactions (energy transfer, weather, and climate).

Builds On: Work with the oceans begins in the fifth grade SOL and continues to increase in complexity through the eighth grade SOL.

B 38 All of the following are sources of energy derived from the ocean *except* —

- F coal
- G thermal
- H tides
- J waves

Instruction: Provide students an opportunity to investigate energy flow in oceans.

Earth Science

End of Course

A. Standard of Learning: ES.12 The student will investigate and understand the origin and evolution of the atmosphere and the interrelationship of geologic processes, biologic processes, and human activities on its composition and dynamics. Key concepts include

d) atmospheric regulation mechanisms.

Builds On: Work with the atmosphere begins with the first grade SOL and increases in complexity through the eighth grade SOL.

A

39 Water vapor is lighter than many atmospheric gases such as oxygen, nitrogen, and carbon dioxide. Why then doesn't water vapor rise above these other gases to a higher level of the atmosphere?

- A Water vapor contains other elements that give it weight.
- B The cool atmosphere condenses the rising water vapor and causes it to fall back to Earth.
- C The water molecules are attracted to molecules of heavier gases and remain in the lower regions of the atmosphere.
- D There is an attraction among the water vapor molecules to hold them together close to the Earth.

Instruction: Provide students an opportunity to investigate the water cycle.

Earth Science

End of Course

A. Standard of Learning: ES.13 The student will investigate and understand that energy transfer between the sun, Earth, and the Earth's atmosphere drives weather and climate on Earth. Key concepts include

a) observation and collection of weather data.

Builds On: Work with analyzing weather data begins with the fourth grade SOL and increases in complexity through the eighth grade SOL.

A

40

Weather Observed at Charlottesville, Virginia	
Temperature	23°C
Humidity	38%
Dewpoint	8°C
Wind	East at 9.7 kph
Pressure	1020 mb
Sky Condition	Clear
Visibility	24 kilometers

Weather Observed at Norfolk NAS, Virginia	
Temperature	13°C
Humidity	89%
Dewpoint	11°C
Wind	East at 12.9 kph
Pressure	1020 mb
Sky Condition	Mist
Visibility	10 kilometers

Which factor would best explain why Charlottesville is clear while Norfolk has mist?

- F Temperature
- G Humidity
- H Wind speed
- J Pressure

Instruction: Provide students an opportunity to observe, collect, and interpret weather data.

Earth Science

End of Course

A. Standard of Learning: ES.13. The student will investigate and understand that energy transfer between the sun, Earth, and the Earth's atmosphere drives weather and climate on Earth. Key concepts include

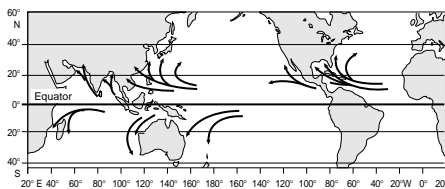
c) weather phenomena and the factors that affect climate.

Builds On: Work with analyzing weather data and phenomena begins with the fourth grade SOL and increases in complexity through the eighth grade SOL.

A

41

Hurricane Zones



According to the map, most hurricanes occur where —

- A the oceans are warmest
- B the landmasses are largest
- C the atmosphere is driest
- D areas of greatest population exist

42 Moist air from the Pacific Ocean rises and cools as it passes from west to east over the Sierra Nevada Mountains. Once it is over the mountain range, the air descends and warms on the other side. What is the result of the air ascending, then descending over the mountains?

- F Desert on the west side of the mountains and heavy rains on the east side
- G Heavy rains on the west side of the mountains and desert on the east side
- H Heavy rains on the west side of the mountains and year-round snow on the east side
- J Desert on the east and west sides of the mountains and heavy rains on top of the mountains

Instruction: Provide students an opportunity to investigate where hurricanes develop and the effect of mountains on precipitation levels.

Earth Science

End of Course

Reporting Category: Astronomy and Space Science

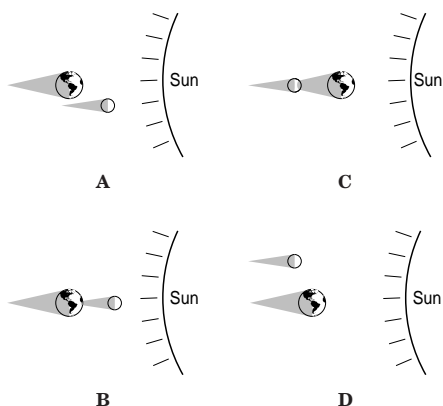
A. Standard of Learning: ES.4 The student will investigate and understand the characteristics of the Earth including

c) position of the Earth in the solar system.

Builds On: Work with the relationship with the motion of the Earth and the sun begins in the fourth grade SOL and continues to increase in complexity through the eighth grade SOL.

A

- 43 Which diagram represents the placement of the sun, Earth, and moon during a lunar eclipse?



- 45 The pole star, Polaris, is nearly stationary and straight overhead when seen from the North Pole. When viewed from the Equator, it —

- A is nearly stationary and on the horizon
- B is nearly stationary and directly overhead
- C rises barely above the eastern horizon, moves along the southern horizon, and sets in the West
- D rises straight up in the East, passes directly overhead, and descends straight down in the West

- 44 The Southern Hemisphere is warmer in January than in July because —

- F it is experiencing summer
- G the cold winds are concentrated in the Northern Hemisphere
- H the sun puts out more energy
- J the hole in the ozone layer allows more heat into the atmosphere

Instruction: Provide students an opportunity to investigate the effect of the sun on the Earth relative to the tilt of the Earth.

Earth Science

End of Course

A. Standard of Learning: ES.14 The student will investigate and understand the planets and other members of the solar system; the history and contributions of the space program; and concepts related to the origin and evolution of the solar system, galaxy, and universe. Key concepts include

a) characteristics of the sun, planets, their moons, comets, meteors, and asteroids.

Builds On: Work with the solar system, including historical contributions, begins with the fourth grade SOL and increases in complexity through the eighth grade SOL.

A

46 A person weighs more on the Earth than on the moon because the Earth has a greater —

- F density
- G atmospheric pressure
- H magnetic strength
- J gravitational pull

48 Parallax can be used to measure a star's —

- F distance from Earth
- G atmospheric temperature
- H gravitational strength
- J surface composition

47 About how long does it take the Earth to make one complete rotation on its axis?

- A One day
- B One week
- C One month
- D One year

Instruction: Provide students an opportunity to investigate differences between the Earth and the moon; to investigate Earth's rotation on its axis; and to investigate astronomical measurements.

Earth Science

End of Course

A. Standard of Learning: ES.14 The student will investigate and understand the planets and other members of the solar system; the history and contributions of the space program; and concepts related to the origin and evolution of the solar system, galaxy, and universe. Key concepts include

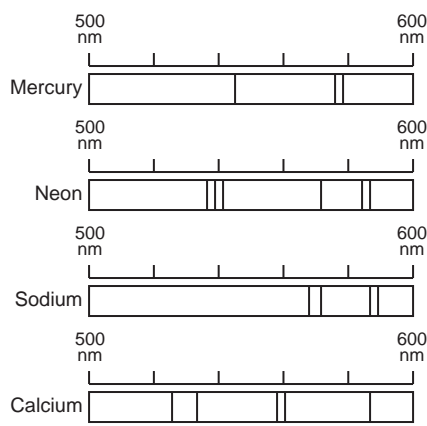
b) cosmology and the origin of stars and stellar systems (the Big Bang, the solar nebular theory, stellar evolution, star systems, nebulae, constellations, and galaxies).

Builds On: Work with the composition of stars (Sun) begins with the fourth grade SOL and increases in complexity through the eighth grade SOL.

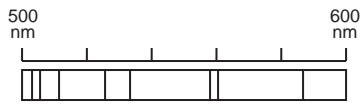
A

49

Atomic Spectra of Certain Elements



Spectrum of Star X



Which of these elements does this star contain?

- A Mercury
- B Calcium
- C Sodium
- D Neon

50 A star might be much brighter than it appears to be. This is called the star's absolute magnitude. The difference in apparent magnitude and absolute magnitude is due primarily to the star's —

- F surface temperature
- G motion through the universe
- H diameter
- J distance from the Earth

Instruction: Provide students an opportunity to investigate the use of atomic spectra in determining the elemental composition of stars; and to investigate methods of measuring the distance of stars from Earth.

Correct Answers

*End
of
Course*

EARTH SCIENCE TEST

1. A	2. H	3. C	4. H	5. D	6. F	7. D	8. F	9. A	10. G
11. D	12. G	13. C	14. J	15. C	16. H	17. B	18. H	19. B	
20. F	21. D	22. G	23. B	24. J	25. B	26. F	27. C	28. G	
29. A	30. F	31. B	32. H	33. D	34. F	35. B	36. J	37. C	
38. F	39. B	40. G	41. A	42. G	43. C	44. F	45. A	46. J	
47. A	48. F	49. B	50. J						